

CASE STUDIES

Fluid Power Division



Reviving a Hydraulic System with our Pulse Flushing Rig

The Challenge

At Torishima, we take pride in our collaboration with National Plant Solutions, where our dedicated team took on the challenge of restoring a customer's Liebherr Road Rail Excavator that had suffered a severely compromised hydraulic system.

When the machine's primary hydraulic pump suffered a catastrophic failure, it caused a significant influx of debris throughout the hydraulic system. The usual process for removing this debris involves disassembling and manually cleaning various components of the machine, a time-consuming and often impractical endeavor.



The Solution

In our commitment to innovation and efficiency, the Torishima Fluid Power Team provided National Plant Solutions with a solution: our Heavy-Duty Pulse Hydraulic Flushing Rig.

Our Heavy-duty Flushing Rig is a self-contained hydraulic pump and filtration unit, offering customizable settings for pump flow and maximum pressure to meet each customer's unique needs. Additionally, we offer a range of hydraulic oil filters tailored to specific requirements.

To ensure an effective flushing process, the rig's 100-liter hydraulic oil tank is equipped with a heating system, ensuring the oil is at the optimal working temperature. The secret to our success lies in the rig's ability to pulse hydraulic oil through the system, creating dynamic "waves" that effectively flush out debris. Our dedicated engineers were on-site to provide expert guidance on seamlessly connecting the Heavy-Duty Pulse Flushing Rig to the Road Rail Excavator's hydraulic system.



Cooling Systems for Marine Winches

The Challenge

The customer faced a tight deadline to deliver eight cooling skids for the drag brake system of a pipe-laying vessel. Each cooling unit needed to achieve high heat dissipation through a large air-blast cooler. The systems had to operate as fully self-contained units, with all components, including the electrical control panel, mounted within a marine-grade transportable frame.

The Solution

Torishima successfully designed, manufactured, tested, and dispatched all eight cooling skids within a demanding five-week timeframe. The frames were constructed from steel, coated for corrosion resistance, and load-tested to ensure suitability for marine conditions.

Each system included a large stainless-steel reservoir, a centrifugal pump, an air-blast cooler, and an integrated electrical control panel. The reservoir was equipped with a heater, temperature sensors, and a level switch to monitor and maintain optimal operating conditions.

A pressure switch was installed in the outlet pipework to ensure that sufficient pressure and flow were consistently delivered to the drag brake system. The stainless-steel piping was insulated to protect against low ambient temperatures, and flexible hoses were provided for on-site connection to the drag brakes.

Benefits

- **Rapid delivery:** All eight units were completed within the tight five-week timescale.
- **Guaranteed performance:** Each skid was fully tested to an agreed FAT, ensuring reliable operation upon delivery.
- **Efficient manufacturing:** The use of 3D design reduced production time and optimized assembly.



Marine Hydraulic Power Unit

The Challenge

To design and manufacture a hydraulic power unit housed within a DNV-type frame, equipped with an axial piston pump capable of varying supply pressure, and a stainless steel reservoir. Additionally, the project required the design and supply of a powered reeler capable of handling 100 meters of hydraulic hoses and electrical cables.

The Solution

The hydraulic power unit and reeler were designed using advanced 3D CAD software, with material strength simulations conducted to ensure structural integrity and performance.

A pressure-compensated axial piston pump with remote pressure control was selected to provide adjustable output. A custom manifold was integrated, incorporating filtration and pressure relief valves to allow precise variation of pump pressure. The 316 stainless steel reservoir was equipped with a return filter and level/temperature switches, while a compact air-blast cooler was installed in the return line for thermal management.

An electrical control panel was included to operate the hydraulic power unit, featuring both local controls and external PLC connectivity.

The powered reeler was engineered to accommodate 100 meters of pressure and return hoses, along with electrical wiring. It was hydraulically driven, with a lever-operated valve enabling directional and speed control. Hydraulic supply to the hoses was routed through the central drive shaft via rotary couplings, with electrical power also transmitted through a dedicated rotary coupling.

Benefits:

- **Proven marine system design:** Leveraged extensive experience to minimize risks during build, testing, and delivery.
- **Integrated solution:** Coordinated supply of the hydraulic power unit and reeler reduced potential interface or compatibility issues.
- **Versatile and efficient pump:** Pressure-compensated axial piston pump provides adjustable output for multiple applications, with high efficiency for lower heat generation and reduced power consumption.
- **Environmentally responsible:** Supplied with biodegradable oil to minimize environmental impact.



Updating Old Accumulator Systems

The Challenge

Torishima Fluid Power was approached to resolve an issue with an aging weighted-type accumulator used to pressurize a series of presses with water. The original accumulators were obsolete, creating a need for a modern, reliable solution that would meet the system's duty cycle while staying within budget.

The Solutions

Leveraging our expertise in Accumulator Technology and Water Hydraulics, we provided a complete design-to-commissioning service. With weighted-type accumulators no longer available, we evaluated bladder and piston alternatives. Piston accumulators exceeded the customer's budget, so we determined that four 50-litre bladder accumulators with 50-litre backup bottles would satisfy the system's requirements.

The new accumulators were lined and fitted with stainless-steel fluid ports and charging valves. They replaced two existing systems, and water hydraulic pressure-reducing valves were installed to supply two different pressures to the presses. The system was integrated with the existing pumps and presses using a combination of stainless-steel piping and hoses with stainless-steel fittings. The complete system was fully commissioned, ensuring reliable operation.

Benefits:

- **Specialist expertise:** Applied knowledge in water hydraulics and accumulators solved a challenging problem cost-effectively.
- **Full-service solution:** Design, supply, installation, and commissioning were provided, reducing risks and lowering overall project costs.
- **Compact, low-maintenance system:** The optimized design reduced system size and simplified ongoing maintenance requirements.



Mobile Hydraulic Systems

The Challenge

Torishima Service Solutions Europe has extensive experience developing hydraulic systems for a variety of off-highway vehicles. Customers typically provide a concept or specification for vehicle operation. Our role is to advise on what can be achieved technically and reliably while staying within budget and meeting required timescales.

The Solution

We leverage a wide network of hydraulic component suppliers to select the most suitable components for each application. Examples of our work include:

- **Aerospace Transport Vehicle:** An open-loop gear pump supplies a slice-type proportional valve controlling wheel motor speed and direction, vehicle steering, and lift functions for the cradle. By using a single open-loop pump to supply all functions, we reduced the number of pumps required.
- **Turf Harvesting Vehicle:** Open-loop load-sense control is used for cylinder and motor functions via a slice valve and bespoke valve manifold. The system controls turf-lifting cylinders and hydraulic motors driving cutting and conveyor operations.

For all systems, we support design, supply, installation, and commissioning. Pipework is flushed and pressure-tested to international standards, and commissioning is completed according to an agreed plan, finalized only when the customer is satisfied.

Benefits

- **Flexible approach:** Ensures technical specifications are met while staying within budget and lead times.
- **Proven experience:** Customers receive reliable and safe hydraulic systems.
- **In-house design:** Efficient system design reduces vehicle fuel consumption and minimizes hydraulic system heat generation.



Piston Accumulator Recertification

The Challenge

Torishima Fluid Power was tasked with overhauling and recertifying 20-litre piston accumulators used on wind turbines, ensuring their safe and reliable operation.

The Solution

Torishima has the facilities and expertise to inspect, service, and pressure-test accumulators safely and efficiently. The process begins with a thorough external and internal inspection to ensure the accumulators are free from damage, as any defects may render them unsuitable for reuse.

Following the inspection, each accumulator is pressure-tested at 1.5 times its maximum working pressure. Our facilities allow for safe testing of multiple units simultaneously, with up to 40 accumulators serviced in a single project.

The service also includes support for system integration, including pipework flushing and pressure testing to international standards. Commissioning is carried out according to an agreed plan and is only finalized when the customer is fully satisfied.

Benefits:

- **Flexible approach:** Ensures technical specifications are met while staying within budget and delivery timelines.
- **Proven experience:** Customers receive a reliable and safe hydraulic system.
- **Efficient service:** In-house processes and testing reduce downtime and extend the operational life of the accumulators.



Turf Lift Vehicle Hydraulics

The Challenge

Our customer experienced frequent hydraulic issues with their Turf Lifting Vehicle, including regular breakdowns, excessive wear on mechanical components, and high fuel consumption.

Technical Situation

The vehicle was powered by multiple fixed-displacement gear pumps, with excess oil routed over relief valves, resulting in inefficiencies. Numerous standard CETOP valves and extensive hoses made the system cluttered and difficult to troubleshoot. Additionally, the cylinders were incorrectly sized, leading to fatigue, leakage, and premature failure.

The Solution

Torishima redesigned the hydraulic system to improve efficiency, reliability, and control. Key improvements included:

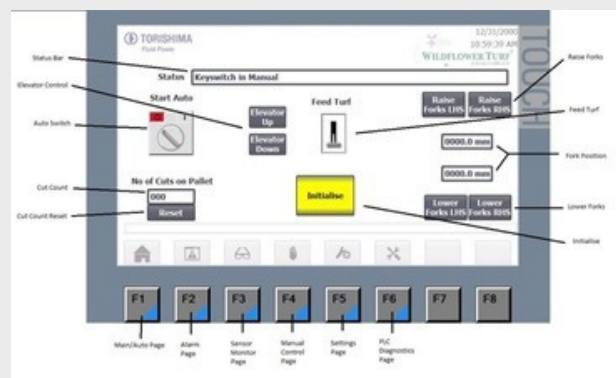
- **Mobile directional valve and custom manifolds:** Reduced the number of valves and connections, providing smoother machine operation.
- **Custom cylinders:** Replaced with correctly sized strokes for the application, with some fitted with LVDTs to monitor movement.
- **New control panel:** Designed with a PLC and HMI to improve control and simplify troubleshooting.

The upgraded system was installed, commissioned, and fully integrated with the vehicle, ensuring optimal performance.



Benefits:

- **Reduced fuel consumption:** Up to 50% savings achieved.
- **Enhanced system reliability:** Fewer breakdowns and reduced mechanical wear.
- **Improved control:** Better machine operation reduced scrap and minimized stress on vehicle components.
- **Simplified system:** Fewer components and hoses reduced potential leak points and maintenance requirements.



Conclusion

This case highlights Torishima's ability to address complex challenges through a rigorous, innovative, and customer-focused approach.

Our team combines technical expertise with an unwavering commitment to sustainability and efficiency, delivering solutions that exceed both commercial and environmental expectations.

For projects involving hydraulic systems, accumulators, and custom fluid power solutions, **Torishima Europe's Fluid Power Division** is available to provide advice, technical support, and further information.

At Torishima, we transform challenges into successes.



Driving Industrial Evolution

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